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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/750,567	12/26/2000	Edmund J. Mozeleski	99B065/2	6491

7590 03/16/2004  
ExxonMobil Chemical Company  
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EXAMINER

OH, TAYLOR V

ART UNIT PAPER NUMBER

1625

DATE MAILED: 03/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/750,567	MOZELESKI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Taylor Victor Oh	1625	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 March 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4, 7-12 and 15-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7-12 and 15-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 2/18/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

Applicant's arguments with respect to claims 1-4, 7-12, and 15-58 have been considered but are moot in view of the new ground(s) of rejection.

The Status of Claims

Claims 1-4, 7-12, and 15-58 are pending.

Claims 1-4, 7-12, and 15-58 have been rejected.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 7-10, 20, 24-26, 31-32, 36-39, 49, 52-54, and 58 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1, 24, 36-37, and 58, the phrase "an acid product comprising" is recited. This expression "comprising" is vague and indefinite. This is because what the meaning of the phrase "an acid product comprising" is that the acid product may contain many additional components. The expression of "an acid product" would mean a single product. An appropriate correction is required.

In claims 20, 31-32, and 53-54, the phrase "the (concentrated) acid product comprises" is recited. This expression "comprises" is vague and indefinite. This is because what the meaning of the phrase "the (concentrated) acid product comprises" is that the acid product may contain many additional components. The expression of

"the (concentrated) acid product" would mean a single product. An appropriate correction is required.

In claims 7-10, the phrase "contacting the olefin comprises contacting" is recited. This expression "comprises" is vague and indefinite. This is because what the meaning of the phrase "the olefin comprises" is that the olefin may contain many additional components. The expression of "the olefin" would mean a single product. An appropriate correction is required.

In claims 25-26, the phrase "contacting methyl-t-butylether comprises contacting" is recited. This expression "comprises" is vague and indefinite. This is because what the meaning of the phrase "methyl-t-butylether comprises" is that the methyl-t-butylether may contain many additional components. The expression of "methyl-t-butylether" would mean a single product. An appropriate correction is required.

In claims 41-44, the phrase "contacting the olefin or ether comprises contacting" or "contacting the ether comprises contacting" is recited. This expression "comprises" is vague and indefinite. This is because what the meaning of the phrase "the olefin or ether comprises" is that either the olefin or ether may contain many additional components. The expression of "the olefin or ether" would mean a single product. An appropriate correction is required.

In claims 7-10, 25-26, and 41-44, "contacting the olefin comprises contacting", "contacting methyl-t-butylether comprises contacting", "contacting the olefin or ether

comprises contacting", and "contacting the ether comprises contacting" are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors. The examiner recommends the following changes in those phrases:

"contacting the olefin comprises contacting" should be changed into "the olefin is reacted at."

"contacting methyl-t-butylether comprises contacting" should be changed into "methyl-t-butylether is reacted at."

"contacting the olefin or ether comprises contacting" should be changed into "the ether is reacted at."

"contacting the ether comprises contacting" should be changed into "the ether is reacted at."

Claims 38, 49, and 52 recite the limitation "olefin or ether". There is insufficient antecedent basis for the "olefin" limitation in the claims because their independent claim 37 does not have any limitation of the "olefin." An appropriate correction is required.

In claim 39, the term "the general formula" is recited. The "general" term is vague and indefinite. This expression does not describe how general the formula is.

An appropriate correction is required.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-4, 7-12, 15-23, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jung et al (U.S. 4,311,851) in view of Takahashi et al (U.S. 4,894,188).

Jung et al teaches a preparation of carboxylic acid esters with  $\text{BF}_3$  alcohol complex catalyst ( see col. 1 , lines 1-4) as well as the recovery and recycle of  $\text{BF}_3$  alcohol complex catalyst used in the carbonylation of olefins such as ethylene and propylene to produce carboxylic acid esters by reacting ethylene and propylene with carbon monoxide( see col. 1 , lines 50-52) in the presence of the catalyst prepared in using ratios of from 0.75 to 2 moles of boron trifluoride per an alcohol ( see col. 3 , lines 1-2). Furthermore, when a less than one mole of the boron trifluoride is employed, the catalyst is a mixture of  $\text{BF}_3$ ,  $\text{CH}_3\text{OH}$  and  $\text{BF}_3 \cdot 2 \text{CH}_3\text{OH}$  ( see col. 3 , lines 2-5). Moreover, the reaction may be performed at a temperature of from  $0^\circ$  to  $100^\circ$  C. ( see col. 2 , lines 28-29) at a pressure of from 10 to 300 atmospheres ( see col. 3 , lines 53-55); also, for the separating purpose of the methyl isobutyrate and methanol distillate, the operating temperature ranges are from  $50^\circ$  to  $200^\circ$  C. (see col. 6 ,lines 34-45). In addition, it is recommended to use solvents having from 6 to 20 straight or branched carbon atoms (see col. 3 ,lines 34-37) for the process.

The instant invention, however, differs from the reference in that the olefin is isobutene, a molar ratio of  $\text{ROH} : \text{BF}_3$  is from 1.6 :1 to 4:1, the use of methyl-t-butyl ether is not mentioned, and the product composition contains less than 3% by weight carboxylic acid.

Takahashi et al teaches a process of producing fatty acids or their derivatives by reacting an olefin such as isobutylene (see col. 2 ,line 25), carbon monoxide , and water or reacting an alcohol or its derivative such as methyl-t-butyl ether (MTBE) and carbon monoxide in the presence of hydrogen fluoride catalyst (see col. 2 , lines 7-11).

Moreover, the reaction products containing pivalic acid and methyl pivalate are prepared from n-butylene, i-butanol, t-butanol, methyl -t-butyl ether or diisobutylene in the presence of hydrogen fluoride as the catalyst (see col. 4, lines 18-22). Furthermore, the reference does indicate that an acid catalyst such as sulfuric acid , hydrogen fluoride, and boron trifluoride may be used extensively in the reaction process (see col. 1 , lines 17-21).

With respect to the molar ratio of ROH: BF<sub>3</sub> from 1.6 :1 to 4:1, the Jung et al does teach the preparation of carboxylic acid esters with BF<sub>3</sub> alcohol complex catalyst prepared in using ratios of from 0.75 to 2 moles of boron trifluoride per an alcohol; in other words, the molar ratio of ROH: BF<sub>3</sub> is from 1.3 :1 to 1: 2. The claimed ranges and prior art do not overlap but are so close that one skilled in the art would have expected to have the similar reaction condition in the absence of an unexpected result; a prima facie case of obviousness may be overcome by a showing of the unexpected result.

Concerning the product composition contained less than 3% by weight carboxylic acid, the reference is silent. However, the Jung et al does indicate indirectly that 6% of impurities containing carboxylic acid is obtained by reviewing the passages of Example 1 in which all of the propylene is converted and the selectivity to methyl isobutylate is 94 % (see col. 7 ,lines 27-29). Therefore, it is possible that ,as a result of



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the process, the product composition may contain less than 3% by weight carboxylic acid by routine experimentations.

Jung et al is directed to the preparation of carboxylic acid esters by the olefin with carbon monoxide in the presence of the  $\text{BF}_3$  alcohol complex catalyst. Takahashi et al expressly teaches the process of producing the methyl pivalate either by the reaction process using isobutylene or methyl-t-butyl ether (MTBE) with carbon monoxide in the presence of the  $\text{BF}_3$  catalyst; they are equivalent during the process. Therefore, it would have been obvious to the skillful artisan in the art to have motivated to employ methyl-t-butyl ether (MTBE) as a starting material for the preparation of methyl pivalate as an alternative because both references are directed to the production of carboxylic acid esters.

Claims 24-35, and 37-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al (U.S. 4,894,188) in view of Jung et al (U.S. 4,311,851).

Takahashi et al teaches a process of producing their derivatives of fatty acids or their esters by reacting an olefin such as isobutylene (see col. 2 ,line 25), carbon monoxide , and water or reacting an alcohol or its derivative such as methyl-t-butyl ether (MTBE) and carbon monoxide in the presence of hydrogen fluoride catalyst (see col. 2 , lines 7-11). Moreover, the reaction products containing pivalic acid , methyl pivalate, isononanoic acid, or the like are prepared from n-butylene, i-butanol, t-butanol, methyl -t-butyl ether or diisobutylene in the presence of hydrogen fluoride as the catalyst (see col. 4, lines 18-22). Furthermore, the reference does indicate that an acid

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catalyst such as sulfuric acid , hydrogen fluoride, boron trifluoride or the like may be used extensively in the reaction process (see col. 1 , lines 17-21).

The instant invention, however, differs from the reference in that the acid composition containing the molar ratio of ROH:  $\text{BF}_3$  is from 2 :1 to 4:1, methyl-t-ether is in contact with phosphoric acid, and the molar ratio of methyl pivalate to nonanoic methyl esters is 4 or greater.

Jung et al teaches a preparation of carboxylic acid esters with  $\text{BF}_3$  alcohol complex catalyst ( see col. 1 , lines 1-4) as well as the recovery and recycle of  $\text{BF}_3$  alcohol complex catalyst used in the carbonylation of olefins such as ethylene and propylene to produce carboxylic acid esters by reacting ethylene and propylene with carbon monoxide( see col. 1 , lines 50-52) in the presence of the catalyst prepared in using ratios of from 0.75 to 2 moles of boron trifluoride per an alcohol ( see col. 3 , lines 1-2). Furthermore, when a less than one mole of the boron trifluoride is employed, the catalyst is a mixture of  $\text{BF}_3 \cdot \text{CH}_3\text{OH}$  and  $\text{BF}_3 \cdot 2 \text{CH}_3\text{OH}$  ( see col. 3 , lines 2-5). Moreover, the reaction may be performed at a temperature of from  $0^\circ$  to  $100^\circ \text{C}$ . ( see col. 2 , lines 28-29) at a pressure of from 10 to 300 atmospheres ( see col. 3 , lines 53-55); also, for the separating purpose of the methyl isobutyrate and methanol distillate, the operating temperature ranges are from  $50^\circ$  to  $200^\circ \text{C}$ . (see col. 6 ,lines 34-45). In addition, it is recommended to use solvents having from 6 to 20 straight or branched carbon atoms (see col. 3 ,lines 34-37) for the process.

With respect to the molar ratio of ROH:  $\text{BF}_3$  from 2 :1 to 4:1, the Jung et al does teach the preparation of carboxylic acid esters with  $\text{BF}_3$  alcohol complex catalyst

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prepared in using ratios of from 0.75 to 2 moles of boron trifluoride per an alcohol; in other words, the molar ratio of ROH: BF<sub>3</sub> is from 1.3 :1 to 1: 2. The claimed ranges and prior art do not overlap but are so close that one skilled in the art would have expected to have the similar reaction condition in the absence of an unexpected result; a prima facie case of obviousness may be overcome by a showing of the unexpected result.

Regarding the methyl-t-ether in contact with phosphoric acid, Takahashi et al does teach the use of the acid catalyst such as sulfuric acid, hydrogen fluoride, boron trifluoride or the like may be used extensively in the reaction process (see col. 1, lines 17-21). Furthermore, Jung et al does mention phosphoric acid (see col. 5, line 5) in the specification. Therefore, it would have been obvious to the skillful artisan in the art to have motivated to employ phosphoric acid as an acid catalyst for the preparation of methyl pivalate as an alternative to boron trifluoride because Takahashi et al expressly teaches the use of the acid catalyst such as sulfuric acid, hydrogen fluoride, boron trifluoride or the like extensively in the reaction process.

Concerning the molar ratio of methyl pivalate to nonanoic methyl esters being 4 or greater, the references are silent. However, it is possible that the reaction products may contain pivalic acid, methyl pivalate, isononanoic acid, or the like such as nonanoic methyl esters which are prepared from n-butylene, i-butanol, t-butanol, methyl-t-butyl ether or diisobutylene in the presence of hydrogen fluoride as the catalyst (see col. 4, lines 18-22). Regarding the molar ratio of methyl pivalate to nonanoic methyl esters being 4 or greater, the limitation of a process with respect to ranges of pH, time and concentration does not impart patentability to a process when such values are

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those which would be determined by one of ordinary skill in the art in achieving optimum operation of the process. Concentration is well understood by those of ordinary skill in the art to be a result-effective variable especially when attempting to control selectivity of a chemical process.

Takahashi et al expressly teaches the process of producing the methyl pivalate either by the reaction process using isobutylene or methyl-t-butyl ether (MTBE) with carbon monoxide in the presence of the  $\text{BF}_3$  catalyst; they are equivalent during the process. Jung et al is directed to the preparation of carboxylic acid esters by the olefin with carbon monoxide in the presence of the  $\text{BF}_3$  alcohol complex catalyst. Therefore, it would have been obvious to the skillful artisan in the art to have motivated to incorporate Jung et al ' $\text{BF}_3$  alcohol complex catalyst into the Takahashi et al process of producing the methyl pivalate as an alternative because both references are directed to the production of carboxylic acid esters.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Taylor Victor Oh whose telephone number is 571-272-0689. The examiner can normally be reached from 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mckane can be reached on 571-272-0699. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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3/10/04

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